

cussions that take place at the meetings of the Geological Society of South Africa (Proceedings of the Society for 1905), and by the considerable space given to written criticisms and replies. The Transactions would be very incomplete without these additions, which may be commended to the notice of many publishing societies in our islands. Dr. F. W. Voit, for instance, read a paper (Trans. Geol. Soc., S. Africa, vol. viii., p. 106) on September 4, 1905, entitled "Preliminary Notes on 'Fundamental Gneiss Formation' in South Africa," in which he claimed that the gneisses of the Limpopo Flats correspond to the fundamental formation of the continent of Europe. At the meeting three members contributed structural and mineralogical details from their own notebooks (Proc. for 1905, p. lvii), recorded with an altogether admirable clearness of expression. The full paper was read on October 30, 1905 (Trans., p. 141). Dr. Voit points out, in agreement with his predecessors, that the main granite is intrusive in the Swaziland beds, "long drawn out lenses of quartzite, chlorite, actinolite, and other schists, swimming, as it were, in a granite magma." But the Limpopo gneisses are, for him, still older, and he looks forward to finding the granite intrusive in them also. By the way, we must object to his using, on p. 145, the term "interbedded igneous sheets" for intrusive masses that have come up along planes of fracture in the granitoid mass. On November 20 (Proc. for 1905, p. lxxv) the author sent in a letter in which he supported his views by quoting Mr. Anderson's observations in Natal, and on December 18 Messrs. Sandberg and Jorissen made a reply to Dr. Voit, in which Credner is cited as their authority, in a manner that almost recalls the Wernerian discussions of a hundred years ago. The bottom, if we may speak irreverently, is here knocked out of the "Urgneissformation" with considerable vigour, and the references to European literature, though disfigured by a few misprinted place-names, add zest to a spirited discussion.

Dr. Hatch, in his presidential address (Proc. for 1906, p. xxv), refers to Dr. Voit's suggestion, and remarks that the Limpopo gneiss may be only "a sheared or metamorphic portion of the granite." The address, on the geological history of the South African formations, covers ground on which much has been written, and on which silence might now conveniently be preserved, until some of the critical questions touched on can be decided by new and indubitable evidence.

Mr. J. P. Johnson (Trans. Geol. Soc., S. Africa, vol. viii., p. 135) describes and illustrates primitive stone implements from the plateau of the Victoria Falls. Mr. Lamplugh directed attention to these (Report of Brit. Association for 1905, p. 300) as being possibly older than the excavation of the Batoka Gorge, and Colonel Feilden has already urged their importance upon the readers of this Journal (NATURE, vol. lxxiii., p. 77). We trust that we have said enough to show that geology in the best sense, as a critical and comparative science, flourishes in the dusty and inchoate city of Johannesburg. Probably there is no part of the world where geological phenomena play so large a part in the thoughts of cultivated men.

GRENVILLE A. J. COLE.

AÉRONAUTICS AND METEOROLOGY.

THE fifth conference of the International Commission of Scientific Aeronautics was held at Milan, and commenced its sittings on October 1. The conference was formally opened by Prof. Celoria, representing the committee of the Milan Exhibition, M. Gavazzi, representing the municipality, Prof. Palazzo, and Prof. Hergesell, president of the commission.

A large number of representatives attended the conference; Mr. Dines represented the Meteorological Office, and the other English members were Major Baden-Powell, Mr. Patrick Alexander, and Mr. Charles Cave.

The first meeting for the discussion of scientific questions was held in the afternoon of October 1 under the presidency of General Rykatchew and Prof. Palazzo. Prof. Hergesell read his report, and various questions were discussed relating to the business of the conference. In the

evening the committee of the exhibition entertained the members of the conference at dinner.

On October 2 the members went to Pavia, where M. Gamba showed them over the observatory, and liberated two *ballons-sondes*. After visiting the university the members were entertained at luncheon by the municipality of the town.

The second meeting was held on October 3 under the presidency of Prof. Assmann and M. Teisserenc de Bort. Dr. Erk urged the necessity of making ascents in the neighbourhood of the Alps for studying local phenomena, such as the Föhn. M. de Quervain explained a method of using small pilot balloons for determining the winds at different altitudes; small india-rubber balloons were liberated and watched with a theodolite; assuming that the balloon ascended with uniform velocity, it was possible to determine its course from one station. Prof. Hergesell spoke very highly of the method which he had used at Strasbourg and elsewhere, and mentioned that in Spitsbergen he had watched the balloon to a distance of 80 kilometres. M. Ebert explained his method of determining the deformation of the electrical equipotential surfaces in the neighbourhood of a balloon, and exhibited a new apparatus for measuring the ionisation of the air.

The third meeting was held in the afternoon of October 3 under the presidency of Colonel Vives y Vich and Mr. Cave. General Rykatchew and M. Riabouschinsky read the reports of the work of their observatories. M. de Quervain read a paper on the thermal inertia of thermometers used in kite and balloon ascents. In connection with this an important discussion took place on the relative value of *ballons-sondes* and kites for the study of the air up to 5000 metres or so. Prof. Hergesell strongly advocated the use of balloons in preference to kites; General Rykatchew and M. Berson thought that kites were far more suitable.

Mr. Rotch read a paper on the ascents of *ballons-sondes* in America, and General Rykatchew read a paper on the temperature gradient as observed at Pavlovsk.

Prof. Hergesell explained a method of recording vertical movements in the atmosphere by attaching a "log" to balloons. M. de Quervain gave proofs of the reality of the isothermic zone.

In the morning of October 4 the members visited the aeronautical section of the exhibition, and *ballons-sondes* were liberated by M. Gamba, M. Teisserenc de Bort, and Prof. Hergesell. In the afternoon the fourth meeting was held under the presidency of Mr. Rotch and M. Scheimpflug. General Rykatchew described M. Kouznetzow's method of determining the height of clouds at night by means of a search-light, and gave some of the results obtained at Pavlovsk. M. Köppen, M. Teisserenc de Bort, and Mr. Rotch observed that the method had been used at Hamburg, in France, and in America. Mr. Alexander read a communication on the forms of propellers for flying machines.

M. Moedebeck urged the necessity of having descriptive charts for aeronautical purposes that would show, for example, dangerous places such as those where there were wires carrying currents at a high potential. M. Scheimpflug gave an account of his method of making maps from photographs taken from balloons. M. Teisserenc de Bort read a report on the necessity of extending the number of stations at which ascents are made, and Prof. Hergesell said he would make every effort to carry out this suggestion. Prof. Palazzo said he hoped that he would shortly be able to establish a kite station on Mount Etna. M. Hinterstoisser then gave a lecture on aeronautics from the points of view of science and sport, and illustrated it with lantern-slides.

On Friday, October 5, M. Mangili, president of the committee of the exhibition, entertained the members in an excursion by steamboat on the Lago Maggiore. It had been proposed to make kite ascents, but this proved impossible owing to want of wind. Prof. Hergesell attempted to demonstrate his method of dropping *ballons-sondes* at sea. Unfortunately his apparatus had not arrived, and the *ballon-sonde* sent up did not come down as soon as was intended, and was last seen at a great height and still ascending.

The fifth meeting was held on October 6 under the presidency of M. Köppen and Mr. Dines. Prof. Hergesell explained his method of making balloon ascents at sea. Two balloons are used, one being held by a fastening that can be opened electrically; a small battery is sent up with the instruments, and the electromagnetic release can be worked by a contact actuated by the barometer, or by a contact on the recording drum of the instruments; the latter has been found the better method in practice. One balloon being released, the system slowly falls, until a float hanging below the instruments touches the water; the balloon is inflated so as to hold the instruments above the sea, the float alone touching the water. Both M. Teisserenc de Bort and Prof. Hergesell stated that they are designing a method by which instruments may be dropped from *ballons-sondes* by wireless telegraphy; the former also hopes to be able to detach kites by the same method. M. Teisserenc de Bort thought that for work on land, when for any reason the height of the ascent had to be limited, his method of using paper balloons was to be preferred.

Baron von Bassus exhibited an instrument for reading the records of kite and balloon ascents. He claimed that his instrument would give readings with great accuracy, and that simultaneous points on the different curves could be obtained easily. He thought that by its use small inversions of temperature could be detected that were often overlooked.

M. Teisserenc de Bort then gave an account of the expedition to the equatorial regions of the Atlantic organised by Mr. Rotch and himself. Extremely good results had been obtained, and, contrary to expectation, it was found that in the upper air far lower temperatures were recorded over the equator than at corresponding heights in temperate latitudes. Over the equator the isothermal zone did not seem to exist, but the temperature went on decreasing up to the highest points reached. At heights of 13 to 14 kilometres temperatures had been found as low as -80°C .

At the concluding meeting, held on the afternoon of October 6, various resolutions were passed relating to future conferences. It was resolved that in future the meetings should be held every three years, and that, so far as possible, they should be restricted to three days. Papers relating to instruments and to methods of observation should have precedence over those dealing with the results of observations. It was also agreed that, instead of the present arrangement of having one international day each month, there should be three days together four times a year for the purpose of the international ascents. This arrangement should come into force in March, 1907.

The president then read telegrams that it was proposed to send to the King and Queen of Italy, to the Spanish Minister of War and others, who had taken an interest in the work of the commission. After several speeches the conference then closed.

On Sunday, October 7, an *aéronautic fête* was held in the grounds of the exhibition, and eight balloons made ascents, several members of the conference being passengers. The majority of the balloons descended in the neighbourhood of Pavia.

MODERN NEEDS IN UNIVERSITIES.¹

UNIVERSITIES in America and Canada are paying more and more attention to our own language and classics, and less and less to Latin and Greek. Not that the latter are excluded, but they no longer outrank other branches of study. Their doors are open to the new forces of the day, and they have at their heads a body of remarkably able and zealous men who not only keep the universities foremost as progressive educative agencies, but whose potent voices are heard upon public questions, as leaders of the higher ideals in politics and national affairs. Much can also be said of those occupying similar positions in Scotland. St. Andrews has just erected a new chemical laboratory for research, Dundee is about to erect such

¹ From an address delivered by Dr. Andrew Carnegie at the opening of new buildings for the natural philosophy and engineering departments of the University of Edinburgh on October 16.

schools as we are to-day to open for Edinburgh. We all know where Glasgow stands in modern branches of education. Aberdeen has just been supplied with new buildings efficiently equipped for the study of science and medicine. No less than eleven new chambers have been assigned to modern studies, to meet pressing demands. The University of London recently separated economics and engineering from arts, and established separate faculties. It is also announced that owing to the unrivalled facilities found in the metropolis, it has to be prepared for the advent of new schools of practical study or research. In the new Universities of Liverpool, Manchester, Birmingham, Leeds, and Sheffield, modern studies are to be paramount. They are to resemble the American type. Harvard University has just been left 800,000*l.* sterling for an institute of technology, but as one of the foremost of such schools is in Boston, she has proposed union with that, and offered if needed new buildings, as part of the University. McGill University, Montreal, has just had handed over to her the agricultural college built by Sir Wm. Macdonald at a cost of 600,000*l.* Thus the millions are now being devoted to science and practical studies, theology and classics being in the opinion of donors already amply provided for. This betokens a steady march forward from the policy of the past, not that it is desirable to exclude any of the former university courses, but there should be added others needed to guide and advance the new knowledge which is creating new conditions.

I judge Scotland to be as far and as happily advanced beyond England in university as she is in elementary public-school education. Her universities are not for a class, but for the people, stirring hives of Democracy. But Scotland may expect the new universities of the five principal English cities to approach nearer to American institutions in character, for their educational atmosphere and aims are very different indeed from those of Oxford and Cambridge, and similar to those of the great American cities. They will be modern universities, fully equipped for the work of to-day. Scotland has to keep marching on. The progress of scientific departments in British universities, considerable as it has recently been, of which the schools we are about to open here to-day are gratifying evidence, yet has not kept pace with the startling progress of science itself and the wonderful discoveries which threaten to revolutionise human conceptions. The discovery of argon by Rayleigh, Becquerel's rays, Röntgen rays, uranium, and, finally, the Curies' radium, threatens to relegate the old atomic theory itself to the list of discarded "creeds outworn," except that science has no creeds. She has only theories and opinions based upon phenomena, all held lightly because subject to progressive discoveries that may be revealed through her unceasing search for knowledge. Science has no preconceived dogmas; she has but one end, the pursuit of truth. It was long claimed for the classics that they alone appealed to the imagination, while dry, prosaic science was incapable of doing so. This is a grievous mistake. The recent discoveries that have startled the world are sublime, and appeal with intense force to the imaginative faculties of man. The scientific man of to-day lives in an atmosphere of wonder, arousing all his higher powers and compelling reverence. At each startling revelation he feels "as some watcher of the skies when a new comet swims into his ken."

The older branches of learning in our universities may well welcome the newer branch, cap in hand, not only as the foundation of material progress, but also as one of the very highest agencies in the imaginative domain. It is the man of science in our day

"Who can extract each particular virtue from the sun,
And teach dull nature what her forces are."

This mighty force of our day—science—has hitherto been the Cinderella of the sisterhood of knowledge, but the Prince has appeared at last and taken her by the hand. It is now the turn of the elder sisters to greet the once neglected princess. She will more than justify the millions which are now being showered upon her in the most progressive lands. Thus has the university developed to the present all-embracing type through the successive reigns of scholasticism, theology and ancient classics, always